Review Report: Evaluation of the effects of fishing on Essential Fish Habitat in Alaska

By

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1. Executive summary

All fishery management plans are now required by law to describe and identify Essential Fish Habitat (EFH) for the fishery, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other measures to promote the conservation and enhancement of EFH (see Magnuson-Stevens Fishery Conservation and Management Act). An evaluation of the effects of fishing on EFH was conducted by the National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council utilizing a newly developed, quantitative mathematical model to show the expected long term effects of fishing on habitat. The model output was used to address whether continued fishing at the current rate and intensity was likely to alter the ability of a managed species to sustain itself over the long term using the ability of each stock to stay above its minimum stock size threshold (MSST) as a standard. In addition, an assessment of how those changes affect managed fish stocks was made. The model estimates the proportional reductions in habitat features relative to an un-fished state, assuming that fishing will continue at the current intensity and distribution until the alterations to habitat and the recovery of disturbed habitat reach equilibrium. It was argued that the model provides a tool for bringing together all available information on the effects of fishing on habitat, such as fishing gear types and sizes used in Alaska fisheries, fishing intensity information from observer data, and gear impacts and recovery rates for different habitat types. It was concluded that despite persistent disturbance to certain habitats, the effects on EFH are minimal because there is no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The review revealed that the mathematical model was a logical construct that with good quality data and accurate parameterization could yield meaningful results. Unfortunately, much of the necessary input data was lacking and parameter estimates were based on untested assumptions. The most critical data deficiencies involved types, proportion, and distribution of substrates, and unobserved/unrecorded fishing effort. Parameter estimates of some of the model variables such as recovery rates and sensitivity of habitat features were particularly weak. Habitat dependency of the various managed stocks was generally not quantitatively evaluated and incorporation of on-going research aimed at defining

essential fish habitat by the Alaska Fisheries Science Center could have been better integrated, both in the development and testing of the model and the qualitative evaluations of effects on managed species. Different approaches, either model based or empirical only, may be required for different groups of species to assess EFH (e.g. data rich versus data poor stocks). Such an alternative, directed approach would treat each managed stock on an in-depth depth basis, tailored to the available data as opposed the "one-size fits all" approach that was adopted. Further, consideration of stock status relative to MSST for determining whether fishing alters the capacity of EFH to support managed species was found insufficient. MSST is a higher order metric that is poorly matched with output of the spatially resolved, fishing effects model. Spatially explicit standards for each of the managed stocks, based on existing survey data, need to be developed that would provide information on stock structure and health. For example, habitat alteration/degradation due to fishing could be manifested in changes in diet and/or feeding intensity that may ultimately be reflected in growth and condition. Other concerns with the use of MSST as a standard include: it is empirically determined, sensitive to the length of the data series, relatively short compared to the generation times of the managed species, and will change with the addition of new data. Finally, the opinion of the evaluators on the effects of fishing on EFH of the various managed stocks needs to be broadened in a rigorous manner through input from other scientists and stakeholders.

2. Background

The Magnuson-Stevens Fishery Conservation and Management Act requires that every fishery management plan describe and identify Essential Fish Habitat (EFH) for the fishery, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other measures to promote the conservation and enhancement of EFH. The National Marine Fisheries Service (NMFS) and the North Pacific Fishery Management Council recently developed a draft environmental impact statement (DEIS) to consider the impacts of incorporating new EFH provisions into the Council's fishery management plans. The national EFH regulations (50 CFR 600.815(a)(2)) require an evaluation of the effects of fishing on EFH, and this evaluation appears in Appendix B to the DEIS – the focal point for the CIE review. The DEIS analysis concluded that: i) despite persistent disturbance to certain habitats, the effects on EFH are minimal because there is no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term; ii) no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act; and iii) all fishing activities combined have minimal, but not necessarily temporary, effects on EFH, and that no additional management actions are required pursuant to the EFH regulations. Because of the developing state of the new approach used (a quantitative model that estimated the long term effects of fishing on habitat) and the number of assumptions involved in its development and application, the need for independent peer review was considered a necessary requirement. The consultant was approached by the Center for Independent Experts (CIE) to participate in the review and provide a written professional evaluation of

the various materials as described in the attached SOW. The review was completed in 12 days by Dr. Kenneth T. Frank during the period 19 June to 12 July in the cities of Dartmouth and Bedford, Nova Scotia, Canada and Seattle, Washington, USA.

3. Description of review activities

The review involved critical reading of all of the documentation provided. This included:

- The Executive Summary from the *Draft Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (11 pages plus tables and figures);
- The evaluation of fishing activities that may adversely affect EFH (Appendix B to the DEIS; 76 pages plus tables and figures);
- EFH sections of the minutes of the Council's Scientific and Statistical Committee meetings in October 2002, December 2002, February 2003, April 2003, June 2003, and October 2003 (each is approximately 2 pages);
- Section 303(a)(7) of the Magnuson-Stevens Act;
- Pertinent excerpts from the NMFS regulations for EFH (50 CFR 600.10 and 600.815(a)(2)) and the associated preamble (67 FR 2354-2355);
- Pertinent excerpts from the Magnuson-Stevens Act National Standard 1 Guidelines (50 CFR 600.310(d)); and
- Selected public comments on the DEIS that are pertinent to Appendix B, including criticisms of the analytical approach (comments to be selected by NMFS after the close of the public comment period on April 15, 2004). This includes documents from:
    - Geoff Shester
    - Alaska Marine Conservation Council
    - Marine Conservation Alliance
    - The Ocean Conservancy, Oceana, Alaska Oceans Program, National Environmental Trust, Center for Biology Diversity and Defenders of Wildlife

Several references cited in the various documents were also examined and a general literature search of Essential Fish Habitat and Ecosystem Effects of Fishing was conducted. The most relevant literature generated from this search was reviewed. The Alaska Fisheries Science Center web site was also examined for additional information on stock status of the various fish species. This web site also contained Progress Reports for FY2002 and 2003 entitled "Effects of Fishing Gear on Seafloor Habitat" that were extremely relevant to the review but not indicated as such to the review panel.

The review panel attended a one-day workshop at the Alaska Fisheries Science Center, Seattle, Washington on 29 June 2004, as part of the review process. The workshop consisted of a series of presentations followed by questions from the panel. Jon Kurland began the workshop by providing background behind the EFH Environmental Impact Statement (EIS). This was followed Drs. Fujioka and Rose who discussed the fishing effects model, specifically its development, evolution and eventual application to the EFH EIS. Drs. Rose and Hollowed presented an analytical approach for assessing effects

on EFH and managed species. Copies of the presentations were given to each panel member. Questions on the material reviewed by the panel prior to the workshop were forwarded one week in advance to John Kurland for distribution to the authors. These questions plus additional ones raised during the workshop served as the basis for discussion throughout the day. The next day, the review panel convened alone in executive session to discuss their reactions to the presentations and the review material for the purpose of constructing a summary report. Particularly emphasis was given to a critique of Appendix B, where the primary conclusions regarding the effects of fishing on essential fish habitat were drawn.

4. Summary of findings

Each panel member was asked to provide answers to the three questions that are listed below and I have done so in point form following each question.

1. *Does the model incorporate the best available scientific information and provide a reasonable approach to understanding the effects of fishing on habitat in Alaska?*

The answer to the question regarding incorporation of the best available scientific information is yes, but all available data was not used. Given that most of this potentially useful information is available within the region, it should be straightforward to incorporate it directly into the overall evaluation. The net effect would be to improve the confidence in the model output and reduce the number of caveats surrounding its application. Regarding the question whether or not the model is a reasonable approach to understanding the effects of fishing on habitat in Alaska, the answer is yes. It is probably inappropriate to apply the model to the problem at this time without the incorporation of all the available data. Some suggestions to model improvement/testing are provided below.

Point 1.1: Appendix B concludes that comprehensive substrate data sets do not exist for the study area and it is acknowledged on pg. B-8 that "designation of substrate types is useful since much of the recovery rate and fishing effects studies are specific to particular substrates." This is somewhat of an under-statement since the entire analysis depends of well resolved data on bottom types. It is further acknowledged on pg. B-8 that "insufficient amount of data on types, proportion, and distribution of substrates should engender great caution in the application of the analysis results." Finer detail substrate data does, however, exist for the eastern Bering Sea, particularly Bristol Bay and a number of mapping initiatives are underway of major fishing grounds (see Heifetz 2002, 2003 – Alaska Fisheries Science Center Progress reports on Effects of fishing gear on seafloor habitat) that could have provided high resolution substrate data for sub-areas of the model domain. Instead, the coarsest resolution was adopted everywhere. The model could have been easily run within the same area using the coarse versus highly resolved substrate data to examine the sensitivity of the model to the assumption about lack of substrate complexity/heterogeneity.

Point 1.2: Observer data forms the primary basis for quantifying the distribution and intensity of fishing effort. Observer coverage was 100% for vessels > 125' but was generally less than 30% for vessels < 125'. It would have been very useful to see maps (showing catch per unit effort) of the fishery data for each vessel class/gear type combination. All assumptions regarding the location of un-observed effort should be made explicitly.

Based on questioning during the workshop in Seattle it was noted that logbooks exist for the unobserved effort but have not been processed. Analysis of the logbooks would reduce or eliminate the assumptions associated with unobserved effort.

Vessel speeds tend to be dependent on the target species being sought, yet a single value is given for speed in table B.2-4. Depending on the composition of the fisheries in various areas, vessel speeds could be widely varying. Is there sufficient data to construct frequency distributions of vessel speeds for each gear/vessel class combination? If available, this information could greatly improve the swept area estimates.

Are any of the existing fleets being monitored using satellite telemetry? Are there any plans to introduce vessel monitoring systems as part of the fishery management plans? Answers to these questions do not exist within Appendix B but minutes of the 26 June 2003 SSC meeting indicates VMS data do exist and they encouraged the analysts to explore the VMS data as a means to test their assumptions of spatial distribution of fishery effort. Use of such data would also alleviate the many weak assumptions that have been made to estimate the total area subjected to fishing effects. Reliable estimates require monitoring and recording of position from a large fraction, if not all, fishing activity. Similar to the previous suggestion about comparing model runs with coarse and fine resolution substrate data, the same type of comparison could be done with the available VMS data for selected fleet sectors in order to assess the accuracy of calculated swept areas.

Point 1.3: After reading all the requested material it became apparent that several recommendations for future research should be pursued. It came as a surprise to discover that much of the research needed to address the effects of fishing gear on essential fish habitat, as well as research aimed at defining essential fish habitat is on-going and has been for several years (see Heifetz 2002, 2003 – Alaska Fisheries Science Center Progress reports on Effects of fishing gear on seafloor habitat). Therefore, it is strongly recommended that this body of research be better integrated both with the development and testing of the model and the qualitative evaluations of effects on managed species. There are several examples of where on-going habitat related research bears directly on the conclusions drawn in Appendix B. For example, in the FY2003 Progress Report, the project entitled "Effects of bottom trawling on soft-sediment epi-benthic communities in the Gulf of Alaska" by R. Stone concluded that bottom trawling has produced changes to the seafloor and associated fauna, affecting the availability of prey for managed groundfish. He indicated that these changes "should serve as a 'red flag' to managers since prey taxa are a critical component of essential fish habitat." Many additional on-going research projects that deal with exploration of coral and sponge habitat, habitat

associations and dependencies of various managed species, habitat evaluation and mapping, trawl impacts on benthic habitats, spatial and temporal patterns in Bering Sea invertebrate assemblages, and so on, bear directly on the conclusions in Appendix B.

Point 1.4: The Executive Summary and Appendix B provide highlights of a number of areas that have been closed to trawling with the earliest such closure established in 1986. These areas could serve as valuable reference sites for directly evaluating the effects of fishing on the habitat as well as the target species. This represents one alternative to the model based approach developed in Appendix B. Also, such information could have been used to parameterize some of model variables such as recovery rates and sensitivity of habitat features. The research project referenced above (R. Stone) does, in fact, examine the epi-benthic communities inside and outside of two closed areas around Kodiak Island. Very little, if any, of this information was incorporated into Appendix B.

Reference is made to two large area closures in the eastern Bering Sea that are closed to bottom trawling to protect red king crab habitat (see pg. B-20). How was the decision reached to close this area on the basis of habitat protection? Was the model used for this purpose? If not then some alternative framework exists. It should be noted that the conclusions on page B-29 are inconsistent with this information.

Point 1.5: The habitat dependency of the various managed stocks was generally not quantitatively evaluated. However, the high quality bottom trawl survey data base provides the necessary information to conduct such an evaluation, in terms of species distributions and abundances, relative to bottom depth, substrate type, temperature and salinity conditions. There are well developed methods involving use of survey data to derive cumulative distribution functions of the un-weighted and catch weighted sampled habitat (e.g. see Perry and Smith 1994). A recent study by Reynolds (2003) has extended this approach to the analysis of species associations using commercial fisheries data. Presumably similar analyses could be conducted based on fisheries data (both survey and commercial) for the various areas and species. Some researchers have suggested that habitat dependencies may be inferred from distributional patterns at low population levels using an ideal free distribution theoretical framework

2. *Does the DEIS Appendix B analysis provide a reasonable approach for identifying whether any Council-managed fishing activities adversely affect EFH in a manner that is more than minimal and not temporary in nature? (For purposes of this question, the terms "temporary" and "minimal" should be interpreted consistent with the preamble to the EFH regulations: "Temporary impacts are those that are limited in duration and that allow the particular environment to recover without measurable impact. Minimal impacts are those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions.") To answer this question, the panel shall address at least the following issues:*
    a. *Does the DEIS Appendix B analysis apply an appropriate standard (including the consideration of stock status relative to MSST) for determining whether fishing alters the capacity of EFH to support*

managed species, a sustainable fishery, and the managed species' contribution to a healthy ecosystem?

b. Does the DEIS Appendix B analysis give appropriate consideration to localized habitat impacts that may reduce the capacity of EFH to support managed species in a given area, even if those impacts do not affect a species at the level of an entire stock or population?

Point 2.1: The answer to this question is no. MSST is a higher order metric that embodies/integrates many different processes that is poorly matched with the output of the spatially explicit fishing effects model. An appropriate standard must at least be spatially explicit and follow the logic of the fishing effects models. For example, MSST tells one nothing about stock structure, i.e. the number of sub-stocks distributed within the management unit and how it has changed over time. Serial depletion of sub-stocks eventually led to the collapse of several managed stocks in the North Atlantic (Frank and Brickman 2001). Fishermen's knowledge or traditional ecological knowledge can be quite informative as well for delineation of past and present stock structure.

Ten year projections were made to assess whether the stock would be likely to fall below their MSST level under the status quo harvesting policy. A positive MSST analysis justified a rating of minimal or temporary effects. The level of confidence that can be ascribed to such projections must be quite low. Has this exercise been conducted retrospectively to assess the magnitude of the error?

Point 2.2: Habitat alteration/degradation due to fishing could be manifested in changes in diet and/or feeding intensity that may ultimately be reflected in growth and/or condition. If this situation persists it may slowly work its way through reduced stock productivity (e.g. maternal effects on recruitment). Since species-specific length and weight data exist from research vessel surveys, it would be a very straightforward computation to evaluate this data both spatially as well as temporally. The spatial distribution of condition indices for a managed stock could then be compared to the fishing impact distribution within time blocks or annually, depending on the amount of data. This exercise of pattern matching could lead to quite a definitive conclusion. The recent publication by Choi et al. (2004) provides a worked example of spatial/temporal changes in condition factors for groundfish on the Scotian Shelf. The managed fish species population responses must be evaluated in a spatially explicit manner in order to draw any firm conclusions regarding fishing effects on EFH.

Point 2.3: Examining annual changes in distributional patterns (expansion/contraction) of the managed species would also be quite informative assuming that anthropogenic factors could be isolated from environmental forcing. Shima et al (2001) suggested that "it is possible that the activity of multiple vessels that make up commercial fisheries could cause long-term redistribution of pollock". It could be argued that displacement from such locations could have negative impacts on recruitment, growth, and natural mortality. This article hinted at the possibility that vessel noise may have been responsible for the observed distributional changes. If true, how does one deal with this issue and does it fall into the same category as fishing gear effects on seafloor habitat?

Point 2.4: MSST can also be criticized because it is an empirically determined threshold and therefore sensitive to the length of the time series. The time series for the managed species is generally less than one generation (< 30 years). Also, with the addition of new data the MSST threshold level will change. Is there any way to extend the length of the time series using proxy data, even if available for only a few species? What are the calculated virgin biomass estimates for some of the species? Consideration should be given to theoretically based thresholds based on life history characteristics.

Point 2.5: A standard for a "healthy" ecosystem was never addressed, yet it is known that apex predators have often been considered sensitive to ecosystem health. No mention was made of the potential to use marine mammal productivity information as a potential indicator of ecosystem health. Should it be? What would be the conclusion from such an analysis?

Point 2.6: It is essential that the opinion of the evaluators on the effects of fishing on EFH of the various species/stocks be broadened. A similar concern was raised by the SSC who noted that the overall conclusions that were reached are heavily reliant upon expert opinion and each stock's ability to remain above MSST. Opinion surveys with stakeholders would be one obvious suggestion as well as input from researchers involved in the various research projects reviewed in Heifetz (2002, 2003). Well designed, statistically based opinion surveys can be very informative and have been used extensively for fisheries assessment purposes in eastern Canada.

Point 2.7: Localized impacts have not been sufficiently addressed as many of the preceding comments have indicated. It should also be emphasized that it is largely unknown what small vessels are doing (< 60 feet) in terms of their fishing effort distribution.

3. *What if any improvements should NMFS consider making to the model, or to its application in the context of the DEIS, given the limited data available to use for input parameters?*

One improvement would be to introduce temporal dependence in the fishing impacts. In the present model formulation there is no time dependency in the fishing effort data (other than annual), yet the recovery rate parameters are explicitly so. For example, if trawling occurs in the same area at monthly intervals or at intervals equivalent to Rho, much greater impacts are expected. It would be useful to estimate/examine average time interval between overlapping fishing effort. It was also stated that "overlapped effort has less total effect because habitat features removed by previous passes are no longer present". Rationale is that absolution reduction is less with each subsequent contact because less habitat function is available for removal. What about scouring effects? Also, as stated above, it depends on the average time interval between overlapping fishing effort.

5. Conclusion/recommendations:

Conclusions

Preliminary and confirmed results from on-going research associated with fishing gear effects on seafloor habitat need to be integrated as much as possible into parameterization and testing of the model, and in the qualitative evaluations of the effects of fishing on EFH of the various managed stocks. It is also possible that some of the results from this research may be able to "stand alone" or, at the very least, provide another perspective on the evaluation of fishing activities that may adversely affect EFH. The current model, because it is rich with assumptions and has severe input data limitations, yields output which is highly uncertain.

Recommendations

The total number of species/stocks examined in Appendix B should be greatly reduced. It may be fruitful to look only at data rich stocks but in much greater detail than what has been presented thus far. Different approaches may be required for different groups of species to assess EFH.

Essential Fish Habitat Source documents (as NOAA technical memoranda) do not appear to exist for any of the North Pacific fish stocks/species. These are readily available for many stocks in the US Northeast, and had they been available for some of the main species in this review, the evaluation would have been much easier and possibly more definitive.

The current stock size of each species relative to its MSST level is not given for each species. A time series of stock abundance estimates relative to MSST for each species/stock either from analytical stock assessments or survey estimates of abundance alone should be shown for each stock. For some species descriptions, it is clearly stated what the current status is; for example, yellowfin sole is stated as being currently at a high level of abundance (pg B-38). Also, some stocks used trawl survey abundance estimates (rex sole, shallow water flatfish, pg. B-44).

For some species, information on weight or length at age has been given, the rationale for which was that such information would reflect whether or not the quality of feeding habitat had changed or degraded (see pg. B-39 for yellowfin sole as well as arrowtooth flounder, rock sole, flathead sole, Alaska plaice). It is recommended that condition factors be evaluated wherever possible.

It would be very useful to show figures of the fishing effort data given that it is a key element of relatively high quality. Once incorporated into the model, the quality of this data is lowered as it is blended with the other poorer quality/assumed data.

6. References

Choi, J.S., K.T. Frank, W.C. Leggett, and K. Drinkwater. 2004. Transition to an alternate state in a continental shelf ecosystem. CJFAS 61: 505-510.

Frank, K.T. and D. Brickman. 2001. Contemporary management issues confronting fisheries science. J. Sea Res. 45(3-4): 173-187.

Heifetz, J. 2002. Effects of fishing gear on seafloor habitat. Progress report for FY 2002. Alaska Fisheries Science Center. October 2002.

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Perry, R.I. and S.J. Smith 1994. Identifying habitat associations of marine fishes using survey data: an application to the Northwest Atlantic. CJFAS 51: 589-602.

Reynolds, J.A. 2003. Quantifying habitat associations in marine fisheries: a generalization of the Kolmogorov-Smirnov statistic using commercial logbook records linked to archived environmental data. CJFAS 60: 370-378.

Shima, M. A. Hollowed, G.R. VanBlaricom. 2002. Changes over time in the spatial distribution of walleye pollock in the Gulf of Alaska. Fish. Bull. 100: 307-323.

7. Appendices

a. Bibliography of all material provided

b. Statement of Work

Consulting Agreement between the University of Miami and Dr. Kenneth Frank

Background

The Magnuson-Stevens Fishery Conservation and Management Act requires that every fishery management plan describe and identify Essential Fish Habitat (EFH) for the fishery, minimize to the extent practicable the adverse effects of fishing on EFH, and identify other measures to promote the conservation and enhancement of EFH. NMFS and the North Pacific Fishery Management Council recently developed a draft environmental impact statement (DEIS) to consider the impacts of incorporating new EFH provisions into the Council's fishery management plans. The DEIS evaluates three actions: (1) describing and identifying EFH for fisheries managed by the Council; (2) adopting an approach for the Council to identify Habitat Areas of Particular Concern within EFH; and (3) minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH. Most of the controversy surrounding the level of protection needed for EFH concerns the effects of fishing on sea floor habitats. Substantial differences of opinion exist as to the extent and significance of habitat alteration caused by bottom trawling and other fishing activities. Although an increasing body of scientific literature discusses the effects of fishing on habitat, there is no consensus within the scientific community on an appropriate methodology for analyzing potential adverse effects.

The national EFH regulations (50 CFR 600.815(a)(2)) require an evaluation of the effects of fishing on EFH, and this evaluation appears in Appendix B to the DEIS. The evaluation has two components: a quantitative mathematical model to show the expected long term effects of fishing on habitat, and a qualitative assessment of how those changes affect fish stocks. The model estimates the proportional reductions in habitat features relative to an unfished state, assuming that fishing will continue at the current intensity and distribution until the alterations to habitat and the recovery of disturbed habitat reach equilibrium. The model provides a tool for bringing together all available information on the effects of fishing on habitat, such as fishing gear types and sizes used in Alaska fisheries, fishing intensity information from observer data, and gear impacts and recovery rates for different habitat types. Due to the uncertainty regarding some input parameters (e.g., recovery rates of different habitat types), the results of the model are displayed as point estimates as well as a range of potential effects.

After considering the available tools and methodologies for assessing effects of fishing on habitat, the Council and its Scientific and Statistical Committee concluded that the model incorporates the best available scientific information and provides a good

approach to understanding the impacts of fishing activities on habitat. Nevertheless, the model and its application have many limitations. Both the developing state of this new model and the limited quality of available data to estimate input parameters prevent drawing a complete picture of the effects of fishing on EFH. The model incorporates a number of assumptions about habitat effect rates, habitat recovery rates, habitat distribution, and habitat use by managed species. The quantitative outputs of the analysis may convey an impression of rigor and precision, but the results actually are subject to considerable uncertainty.

One major limitation of the model is that it does not consider the habitat requirements of managed species or the distribution of their use of habitat features. Therefore, DEIS analysts were asked to use the model output to address whether continued fishing at the current rate and intensity is likely to alter the ability of a managed species to sustain itself over the long term. In other words, are the fisheries, as they are currently conducted, affecting habitat that is essential to the welfare of each managed species? To help answer that question, the analysts considered available information about the habitats used by managed species. The analysts also considered the ability of each stock to stay above its minimum stock size threshold (MSST), after at least thirty years of fishing at equal or higher intensities. MSST is the level below which a stock is in jeopardy of not being able to produce its maximum sustainable yield on a continuing basis.

The DEIS analysis concludes that despite persistent disturbance to certain habitats, the effects on EFH are minimal because there is no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The DEIS finds that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act. Additionally, the analysis concludes that all fishing activities combined have minimal, but not necessarily temporary, effects on EFH. These findings suggest that no additional management actions are required pursuant to the EFH regulations.

Expertise Needed for the Review

The review panel shall comprise six individuals. Panelists shall have expertise in benthic ecology, fishery biology, fishing gear technology, ecological modeling, and/or closely related disciplines.

Information to be Reviewed

The CIE panel shall review the following materials:

- The Executive Summary from the *Draft Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (11 pages plus tables and figures);

- The evaluation of fishing activities that may adversely affect EFH (Appendix B to the DEIS; 76 pages plus tables and figures);
- EFH sections of the minutes of the Council's Scientific and Statistical Committee meetings in October 2002, December 2002, February 2003, April 2003, June 2003, and October 2003 (each is approximately 2 pages);
- Section 303(a)(7) of the Magnuson-Stevens Act;
- Pertinent excerpts from the NMFS regulations for EFH (50 CFR 600.10 and 600.815(a)(2)) and the associated preamble (67 FR 2354-2355);
- Pertinent excerpts from the Magnuson-Stevens Act National Standard 1 Guidelines (50 CFR 600.310(d)); and
- Selected public comments on the DEIS that are pertinent to Appendix B, including criticisms of the analytical approach (comments to be selected by NMFS after the close of the public comment period on April 15, 2004).

Panelists should refer to the following website to access all background material.

http://www.fakr.noaa.gov/habitat/cie/review.htm

Questions to be Answered

Given the context of the Magnuson-Stevens Act requirements and the EFH regulations, the CIE reviewers shall address the following issues:

1. Does the model incorporate the best available scientific information and provide a reasonable approach to understanding the effects of fishing on habitat in Alaska?

2. Does the DEIS Appendix B analysis provide a reasonable approach for identifying whether any Council-managed fishing activities adversely affect EFH in a manner that is more than minimal and not temporary in nature? (For purposes of this question, the terms "temporary" and "minimal" should be interpreted consistent with the preamble to the EFH regulations: "Temporary impacts are those that are limited in duration and that allow the particular environment to recover without measurable impact. Minimal impacts are those that may result in relatively small changes in the affected environment and insignificant changes in ecological functions.") To answer this question, the panel shall address at least the following issues:

    a. Does the DEIS Appendix B analysis apply an appropriate standard (including the consideration of stock status relative to MSST) for determining whether fishing alters the capacity of EFH to support managed species, a sustainable fishery, and the managed species' contribution to a healthy ecosystem?

    b. Does the DEIS Appendix B analysis give appropriate consideration to localized habitat impacts that may reduce the capacity of EFH to support

managed species in a given area, even if those impacts do not affect a species at the level of an entire stock or population?

3. What if any improvements should NMFS consider making to the model, or to its application in the context of the DEIS, given the limited data available to use for input parameters?

Review Process, Deliverables, and Schedule

The review panel shall consist of six members, one of whom shall serve as the Chair, as specified below.

Duties of the Panelists

1. Each panelist shall attend in person and participate in a one-day meeting with the scientists who developed the fishing-effects model and the analytical approach used to evaluate the effects of fishing in the DEIS. The meeting will be held at the Alaska Fisheries Science Center in Seattle on June 29, 2004. The meeting will be open to the public to attend, but there will be no opportunity for public testimony. The lead authors of the model, Dr. Jeffrey Fujioka and Dr. Craig Rose, will provide an overview of the model, how it was developed, how it was refined in response to comments from the Council's Scientific and Statistical Committee and other reviewers, and how it was used in the DEIS. The panel will have an opportunity to question Dr. Fujioka and Dr. Rose, as well as Dr. Anne Hollowed, who assisted in designing the analytical approach used to evaluate the effects of fishing in the DEIS. The panel shall meet in executive session at the Alaska Fisheries Science Center on June 30, 2004 to discuss the information presented, and to identify any unanswered questions.

2. Prior to the meeting, each panelist shall review the materials specified above. Panelists may submit written questions via e-mail to Jon Kurland (Jon.Kurland@noaa.gov), with copies to the Contracting Officer's Technical Representative (COTR), Stephen Brown (Stephen.K.Brown@noaa.gov), and to the CIE manager, Manoj Shivlani (mshivlani@rsmas.miami.edu) at least two weeks before the meeting to ensure topics of particular interest will be covered during the presentation.

3. Each panelist shall deliver an individual final written report containing answers to the questions posed above and any recommendations. These individual reports shall be submitted the Chair and to Dr. David Die of the University of Miami via e-mail at ddie@rsmas.miami.edu, and to Mr. Manoj Shivlani via email at mshivlani@rsmas.miami.edu no later than July 15, 2004. The reports shall include the following sections: executive summary, background, description of review activities, summary of findings, conclusions/recommendations, bibliography of any materials relied upon by the panel, and a copy of this statement of work. Please refer to the

following website for additional information on report generation: http://www.rsmas.miami.edu/groups/cimas/Report_Standard_Format.html.